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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/715,282	11/16/2000	Anne E. Miller	042390.P8276	6590

8791 7590 06/12/2003

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EXAMINER

CHEN, KIN CHAN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 06/12/2003

15

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/715,282

Applicant(s)

MILLER ET AL.

Examiner

Kin-Chan Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on March 24, 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 12-27 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 6-11 is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

1. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watts et al (US 5,897,375; hereinafter "Watts").

Watts teaches a method of CMP and forming copper interconnect. A copper diffusion barrier layer may be formed in at least a copper interconnect structure (so-called damascene structure in the instant claims). A copper layer may be formed over the barrier layer. A portion of the copper layer may be removed by chemical mechanical polishing (Figs. 1 and 2; col. 3, lines 1-15; col. 4, lines 4-10). Watts teaches the slurry may contain hydrogen peroxide (so-called low electrochemical potential oxidizer), citric acid, citrate salt (e.g., ammonium citrate) and abrasives (e.g., alumina), see col.1, lines 14-17. In one preferred embodiment, Watts teaches that citrate salt may be ammonium citrate or potassium citrate, and abrasive may be alumina abrasive or silica abrasive. Hence, it would have been obvious to one with ordinary skill in the art to use potassium citrate and silica abrasive in the aforementioned slurry which contains citric acid because Watts teaches the equivalence between ammonium citrate and potassium citrate, and also the equivalence between alumina abrasive and silica abrasive. The substitution of one for the other would have been expected to provide the expected result. Therefore, Watts teaches slurry comprising a chelating organic buffer system (such as citric acid and potassium citrate). In addition, Watts is not particular about silica used in the slurry, therefore, it would have been obvious to one with

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ordinary skilled in the art to use colloidal silica because it is one of the most popular silica used in the slurry for CMP process.

As to dependent claims 4 and 5, Watts teaches that the slurry may comprise corrosion inhibitor such as benzotriazole (col. 2, lines 34-35; col. 4, lines 66-67).

Response to Arguments

2. Applicant's arguments with respect to claims 1-5 have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

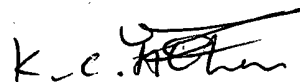
3. Claims 6-11 are allowed.

The following is an examiner's statement of reasons for allowance: The references of record do not teach or suggest a method comprising: after removing copper by CMP with first slurry comprising a chelating organic buffer system, removing barrier layer by CMP using a second slurry comprising a chelating organic buffer system wherein the second slurry without oxidizer.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

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4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (703) 305-0222. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-2934.



Kin-Chan Chen
Primary Examiner
Art Unit 1765

K-C C
June 11, 2003